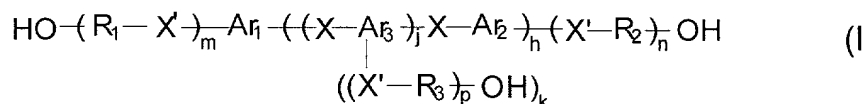


CLAIMS

What is claimed is:

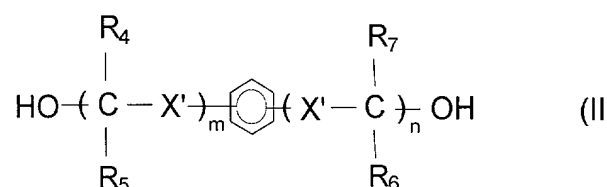
1. A process for making an unsaturated polyetherester resin useful for making curable thermoset resin compositions comprising reacting at least one acid-terminated unsaturated polyetherester resin with at least one aromatic polyol having at least one non-primary hydroxy group to produce an unsaturated polyetherester resin at least partially end-capped with an aromatic polyol.
2. The process according to Claim 1 wherein the at least one aromatic polyol further comprises at least one primary hydroxy group.
3. The process according to Claim 1 wherein the at least one aromatic polyol is represented by the formula



wherein Ar₁, Ar₂ and Ar₃ each independently represents an aromatic group; R₁, R₂ and R₃ each independently represents a non-aromatic predominantly hydrocarbyl group; each X and X' independently represents a hydrocarbylene group, a hydrocarbylidene group, a divalent hetero atom or group, an ester linkage, or a combination thereof; each X' can also represent a covalent bond; h and k each independently represent an integer equal to 0 or 1; j represents an integer in the range from 0 to 5; and m, n, and p each independently represent an integer in the range from 1 to 5, provided that at least one hydroxy group of formula (I) is a nonprimary hydroxy group.

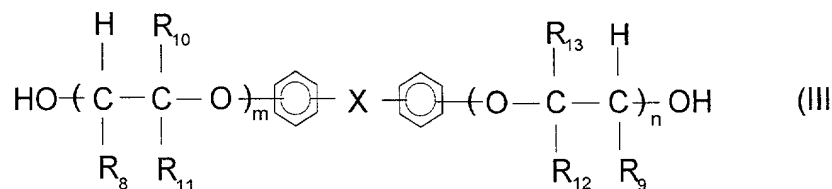
4. The process according to Claim 3, wherein Ar₁, and Ar₂ and Ar₃ when present, each represent a phenylene ring.

5. The process according to Claim 3 or 4, wherein each X, when present, represents a hydrocarbylene or hydrocarbylidene group and each X' represents a hetero atom.
6. The process according to any one of Claims 3 to 5, wherein k is 0.
7. The process according to Claim 6 wherein the aromatic polyol is represented by the formula:



wherein R₄ to R₇ each independently represent a hydrogen atom or a hydrocarbyl group, provided that at least one hydroxy group is a nonprimary hydroxy group.

8. The process according to any one of Claims 3 to 5, wherein k is 1.
9. The process according to Claim 8 wherein the aromatic polyol is represented by the formula:



wherein each of R₈ to R₁₃ represent a hydrogen atom or a predominantly hydrocarbyl group, provided that at least one of R₈ and R₉ is not an hydrogen atom, X represents —C(CH₃)₂—, —S— or —O—, preferably —C(CH₃)₂—, and m and n represent integers which individually are in the range from 1 to 5.

10. The process according to Claim 9 wherein the aromatic polyol is a propylene oxide adduct of bisphenol A.
11. The process according to any one of Claims 3 to 5, wherein h is 1 and j is in the range from 1 to 5.
12. The process according to Claim 11 wherein X is a methylene, alkylene or alkylidene group.
13. The process according to Claim 11 or 12, wherein the aromatic polyol is obtainable by alkoxylating a novolac-type polymer.
14. The process according to Claim 13, wherein the aromatic polyol is obtained by propoxylating a novolac-type polymer.
15. The process according to any one of Claims 1 to 14, wherein the at least one acid-terminated unsaturated polyetherester is obtainable by reacting at least one polyether and at least one ethylenically unsaturated anhydride or dicarboxylic acid in the presence of at least one catalyst effective to promote insertion of the anhydride or dicarboxylic acid into carbon-oxygen bonds of the polyether to produce unsaturated polyetherester resin polymer chains.
16. The process according to Claim 15, wherein the polyether is a polyether glycol having an average hydroxyl functionality of about 2 to about 6, a hydroxyl number of about 28 to about 260 mg KOH/g, and a number average molecular weight of about 400 to about 12,000.
17. An unsaturated polyetherester resin at least partially end-capped with an aromatic polyol obtainable according to any one of Claims 1 to 16.

18. A curable thermoset resin composition useful for imparting water and/or solvent resistance to gel coated fiber-reinforced polymers comprising:
- (A) At least 5 wt. % of at least one unsaturated polyetherester resin according to Claim 17;
 - (B) At least one unsaturated polyester resin having a number average molecular weight to the average number of double bonds per polymer molecule in the range from about 200 to about 400, in an amount such that the weight ratio of polyester resin (B) to polyetherester resin (A) is in the range from about 10:90 to about 90:10;
 - (C) About 10 to about 70 wt. % of at least one vinyl monomer; and
 - (D) At least one curing agent.
19. The composition according to Claim 18, wherein the unsaturated polyester resin (B) is derived from at least dicyclopentadiene, an unsaturated carboxylic anhydride, and a glycol.
20. The composition according to Claim 18 or 19, wherein the vinyl monomer (C) is styrene.
21. The composition according to any one of Claims 18 to 20, wherein the curing agent (D) is a catalyst system comprising a free radical initiator and an accelerator.
22. The composition according to any one of Claims 18 to 21, further comprising:
- (E) at least one aromatic vinyl ester resin.
23. The composition according to Claim 22, wherein the at least one aromatic vinyl ester (E) is a reaction product of epichlorohydrin and bisphenol A, which is further reacted with a vinyl acid to make the at least one aromatic vinyl ester (E).
24. The composition according to Claim 22, wherein the at least one aromatic vinyl ester (E) is the reaction product of epichlorohydrin with a novolac-type resin, which is further reacted with a vinyl acid to form the at least one aromatic vinyl ester (E).

25. An intermediate for making a skin laminate comprising reinforcing fibers and the curable thermoset resin composition according to any one of Claims 18 to 24 in the form of a sheet.
26. A fiber-reinforced polymer composite obtainable by combining a curable thermoset resin composition according to any one of Claims 18 to 24 with reinforcing fiber and curing the curable thermoset resin composition.
27. A gel coated fiber-reinforced polymer comprising the fiber-reinforced composition of Claim 26 and a gel coat.
28. A gel coated polymer laminate comprising at least one fiber-reinforced polymer layer, at least one gel coat layer, and at least one thermoset resin layer interposed between the at least one fiber-reinforced polymer layer and the at least one gel coat layer, wherein the at least one thermoset resin layer is obtainable by applying the curable thermoset resin composition of any one of Claims 18 to 24 or the skin laminate intermediate of Claim 25 as a barrier layer between the gel coat layer and the fiber-reinforced polymer layer and curing the curable thermoset resin composition.
29. The gel coated laminate of Claim 28 wherein the fiber-reinforced polymer layer comprises a reinforcing fiber and a polyester resin.
30. The gel coated laminate of Claim 28 or 29 wherein the ratio of the average thickness of the at least one fiber-reinforced polymer layer and the average thickness of the at least one thermoset resin layer is in the range from about 6:1 to about 2:1.
31. A method for making a curable thermoset resin composition comprising combining:
- (A) At least 5 wt. % of at least one unsaturated polyetherester resin according to Claim 17;

- (B) At least one unsaturated polyester resin having a number average molecular weight to the average number of double bonds per polymer molecule in the range from about 200 to about 400, in an amount such that the weight ratio of polyester resin (B) to polyetherester resin (A) is in the range from about 10:90 to about 90:10;
- (C) About 10 to about 70 wt. % of at least one vinyl monomer; and
- (D) At least one curing agent.

32. An intermediate for making a curable thermoset resin composition comprising

- (A) At least 5 wt. % of at least one unsaturated polyetherester resin according to Claim 17;
- (B) At least one unsaturated polyester resin having a weight ratio of the number average molecular weight to the average number of double bonds per polymer molecule in the range from about 200 to about 400, in an amount such that the weight ratio of polyester resin (B) to polyetherester resin (A) is in the range from about 10:90 to about 90:10; and
- (C) About 20 to about 50 wt. % of at least one vinyl monomer.

33. A method for reducing blistering of a gel coated fiber-reinforced polymer comprising:

- (1) Applying at least one layer of the curable thermoset resin composition of any one of Claims 18 to 24 or the skin laminate intermediate of Claim 25 between a gel coat layer and a fiber-reinforced polymer layer and
- (2) Curing the curable thermoset resin composition.

34. The method according to Claim 33, wherein the method comprises:

- (1) (a) Applying a gel coat composition to a mold,
- (b) At least partially curing the gel coat composition of step (a),
- (c) Applying at least one layer of at least one curable thermoset resin composition according to any one of Claims 18 to 24 or at least one layer of the skin laminate intermediate of Claim 25 to the gel coat of step (b);

- (2) At least partially curing the curable thermoset resin composition of step 1(c); and
- (3) (a) applying at least one fiber-reinforced polymer layer to the at least partially cured thermoset resin composition layer of step (2) and
 - (b) curing the product of step 3(a) to form the gel coated fiber-reinforced polymer.

35. An article obtainable by the method of Claim 33 or 34.

36. The composition according to Claim 18 further comprising at least one unsaturated polyetherester resin other than the unsaturated polyetherester resins according to Claim 17.

37. The composition according to Claim 36 in which the at least one unsaturated polyetherester resin other than the polyetherester resin according to Claim 17 is an unsaturated polyetherester resin end-capped with at least one end-capping compound selected from the group consisting of dicyclopentadiene, an epoxy-containing compound, or both dicyclopentadiene and an epoxy-containing compound.

38. The intermediate according to Claim 32 further comprising at least one unsaturated polyetherester resin other than the unsaturated polyetherester resins according to Claim 17.